

CLAIMS

What is claimed is.

1 1. A method of classifying particles, comprising:
2 placing a fluid into a device, wherein the fluid contains at least two particle types,
3 and wherein the device includes a first electrode, a second electrode, a third electrode,
4 and a conduit disposed between the second electrode and the third electrode;
5 first biasing between the second electrode and the third electrode under conditions
6 to focus a first particle type; and
7 nth biasing between the second electrode and the third electrode under conditions
8 to focus an nth particle type.

1 2. The method according to claim 1, wherein first biasing under conditions to focus
2 a first particle type includes a first particle type that includes a first plurality of particle types.

1 3. The method according to claim 1, wherein first biasing under conditions to focus
2 a first particle type includes a first particle type that includes a first plurality of particle types,
3 and following nth biasing, further including:
4 n+1st biasing between the second electrode and the third electrode under
5 conditions to focus an n+1st particle type.

1 4. The method according to claim 3, wherein $n+1^{\text{st}}$ biasing under conditions to focus
2 a first particle type includes an $n+1^{\text{st}}$ particle type that includes an $n+1^{\text{st}}$ plurality of particle
3 types.

1 5. The method according to claim 1, further including:
2 establishing a convective force in the fluid, wherein the convective force directs the fluid
3 into the conduit.

1 6. The method according to claim 1, further including:
2 establishing a convective force in the fluid, wherein the convective force directs
3 the fluid into the conduit, wherein the conditions to focus a particle type include an
4 electrophoretic mobility for a given particle type that overcomes the convective force in
5 the conduit, and wherein the particle type focuses at the second electrode.

1 7. The method according to claim 1, wherein the first electrode includes a ground,
2 wherein the second electrode includes a varactor, and wherein the third electrode includes a
3 varactor.

1 8. The method according to claim 1, wherein the fluid is pH-buffered.

1 9. The method according to claim 1, wherein the at least two particle types include a
2 plurality of zwitterion molecules.

1 10. The method according to claim 1, after first biasing, further including:
2 second biasing between the second and third electrodes under conditions to
3 separate a second particle type from the fluid.

1 11. The method according to claim 1, after at least one of first biasing and Nth
2 biasing, further including:
3 analyzing at least one of the first particle type and the Nth particle type by a
4 method selected from quantitative analysis, qualitative analysis, and a combination
5 thereof.

1 12. The method according to claim 1, wherein the device further includes:
2 a fluid source reservoir into which is disposed the first electrode;
3 a fluid receptacle reservoir into which is disposed the third electrode; and
4 wherein the conduit communicates between the fluid source reservoir and the
5 fluid receptacle reservoir.

1 13. A device, comprising:
2 a conduit disposed in a dielectric structure;
3 a fluid source reservoir disposed at a first end of the conduit;
4 a fluid receptacle reservoir disposed at a second end of the conduit;
5 an optional first electrode disposed in the fluid source reservoir and spaced apart
6 from the first end of the conduit;

7 a second electrode spaced apart from the first electrode and disposed either in the
8 fluid source reservoir proximate the conduit, or in the conduit proximate the fluid source
9 reservoir;

10 a third electrode disposed in the fluid receptacle reservoir and space apart from
11 the second end of the conduit.

1 14. The device according to claim 13, further including:
2 a fluid-moving device connected to the device.

3 15. The device according to claim 13, wherein the dielectric includes:
4 a first layer including a channel disposed therein; and
5 a second layer disposed above the first layer.

6 16. The device according to claim 13, wherein the conduit includes a liner that resists
7 electroosmosis.

8 17. The device according to claim 13, wherein the conduit includes a hydroxypropyl
9 methyl cellulose liner.

1 18. A system for classifying at least two charged particle types comprising:
2 a device, including:

3 a conduit disposed in a dielectric structure;

4 a fluid source reservoir disposed at a first end of the conduit;

5 a fluid receptacle reservoir disposed at a second end of the conduit;
6 an optional first electrode disposed in the fluid source reservoir and spaced
7 apart from the first end of the conduit;
8 a second electrode spaced apart from the first electrode and disposed
9 either in the fluid source reservoir proximate the conduit, or in the conduit
10 proximate the fluid source reservoir;
11 a third electrode disposed in the fluid receptacle reservoir and space apart
12 from the second end of the conduit;
13 a fluid containing the at least two charged particle types, wherein the fluid is pH
14 buffered, and wherein the fluid is disposed in the fluid source reservoir;
15 a blank fluid disposed in the conduit and in the fluid receptacle reservoir; and
16 a fluid mover for creating a convective force in the conduit.

1 19. The system according to claim 18, wherein the at least two charged particle types
2 include at least two zwitterions.

1 20. The system according to claim 18, wherein the at least two charged particle types
2 include at least two mammalian body serum particle types.

1 21. The system according to claim 18, wherein the dielectric structure is selected
2 from an inorganic dielectric, an organic dielectric, and a semiconductive dielectric.

1 22. A process of making a particle classifier comprising:

2 forming a conduit including a first end and a second end in a dielectric structure;

3 forming a first fluid source reservoir at the first end;

4 forming a first fluid receptacle reservoir at the second end;

5 forming an optional first electrode in the first fluid source reservoir and spaced
6 apart from the first end;

7 forming a second electrode either in the first fluid source reservoir proximate the
8 conduit, or in the conduit proximate the first fluid source reservoir;

9 forming a third electrode in the first fluid receptacle reservoir and spaced apart
10 from the second end.

11 23. The process according to claim 22, wherein forming a conduit includes:

12 etching a channel in a first substrate;

13 covering the first substrate with a second substrate; and

14 optionally treating the channel with a neutralizing process.

1 24. The process according to claim 22, wherein forming a conduit includes:

2 etching a channel in a first substrate;

3 covering the first substrate with a second substrate; and

4 optionally treating the channel with a neutralizing process; and further including:

5 etching the first fluid source reservoir and the first fluid receptacle reservoir
6 through second substrate;

7 forming the second electrode by deposition in the first fluid source reservoir and
8 upon the second substrate; and
9 optionally forming the third electrode by deposition in the first fluid receptacle
10 reservoir and upon the second substrate.

1 25. The process according to claim 22, further including:

2 forming a second fluid source reservoir;

3 forming a second fluid receptacle reservoir;

4 forming a fourth electrode in the second fluid source reservoir; and

5 forming a fifth electrode in the second fluid receptacle reservoir.